Spallation Neutron Source

INTRODUCTION –

The Spallation Neutron Source (SNS) is a new, accelerator-based science facility that will provide neutron beams with up to ten times more intensity than any other such source in the world. Coupled with comparable gains in instrument performance, SNS represents a dramatic step forward in the performance of a neutron-scattering facility designed specifically for studies of the structure and dynamics of materials. SNS is being designed and constructed by a partnership of six U.S. Department of Energy (DOE) national laboratories (Argonne, Brookhaven, Jefferson, Lawrence Berkeley, Los Alamos, and Oak Ridge). Oak Ridge National Laboratory (ORNL) in Tennessee is responsible for the civil construction, project management, design integration, and ultimately for operating the SNS. The other participating laboratories are responsible for design and construction of major technical subsystems that make up the facility.

SNS is being constructed on Chestnut Ridge, an 80-acre site at ORNL. Construction began in December 1999 and is scheduled for completion in 2006. SNS is funded by the DOE Office of Science for a total cost of $1.4 billion. Currently, almost 700 people are working on SNS, including staff at all six partner labs. When completed, about 400 permanent staff will be employed at the facility; many more will be involved in its construction.

Why build the SNS? Most of the world's neutron sources were built decades ago using technology of that era. The uses and demand for neutrons have increased throughout the years, and new, modern sources are required to meet this demand. Basic research and development conducted at SNS will lead to technological and industrial breakthroughs that will ultimately benefit not only the U.S. scientific community but also the business and industrial communities.

ACCOMPLISHMENTS –

Overall, the SNS is more than 40% complete. The front-end, klystron, and linac tunnel foundations are complete, and waterproofing has begun. Concrete for the proton accumulator ring is being poured. The concrete for the floor of the Target Building is completed, and the basement walls are going up.

SNS has maintained an outstanding safety performance, better than typical DOE and industry construction experience. Through the end of April 2002, more than 600,000 hours had been worked on the site with no lost time injuries. The project has not received any environmental violations or fines.

The construction project includes funding for an initial suite of five instruments capable of world-class science. SNS will also provide the infrastructure for common components necessary for these and future instruments. Instrument teams are provided a mechanism

for user community input in instrument design and have begun to lead the development of additional instruments funded by research programs. In return for contributing funding to the construction or operation of instruments, instrument development teams can secure dedicated beamtime for their research programs.

Two new sister facilities will be built on the SNS site: the Center for Nanophase Materials Science (CNMS) and the Joint Institute for Neutron Sciences (JINS). The CNMS will integrate nanoscale research with neutron science, synthesis science, and theory/modeling/simulation, bringing together four areas in which the United States has clear national research and educational needs. JINS will be a residence and conference facility funded by the state of Tennessee. With the SNS and an upgraded High Flux Isotope Reactor at ORNL, the community will have access to both state-of-the-art pulsed and steady-state neutron sources.

USERS –

SNS will provide opportunities for up to 2000 researchers each year from universities, national labs, and industry for basic and applied research and technology development in many different fields, such as

- Materials science
- Magnetic materials
- Superconductors
- Nanomaterials
- Earth sciences
- Polymers and complex fluids
- Chemistry
- Biology

FOR MORE INFORMATION –

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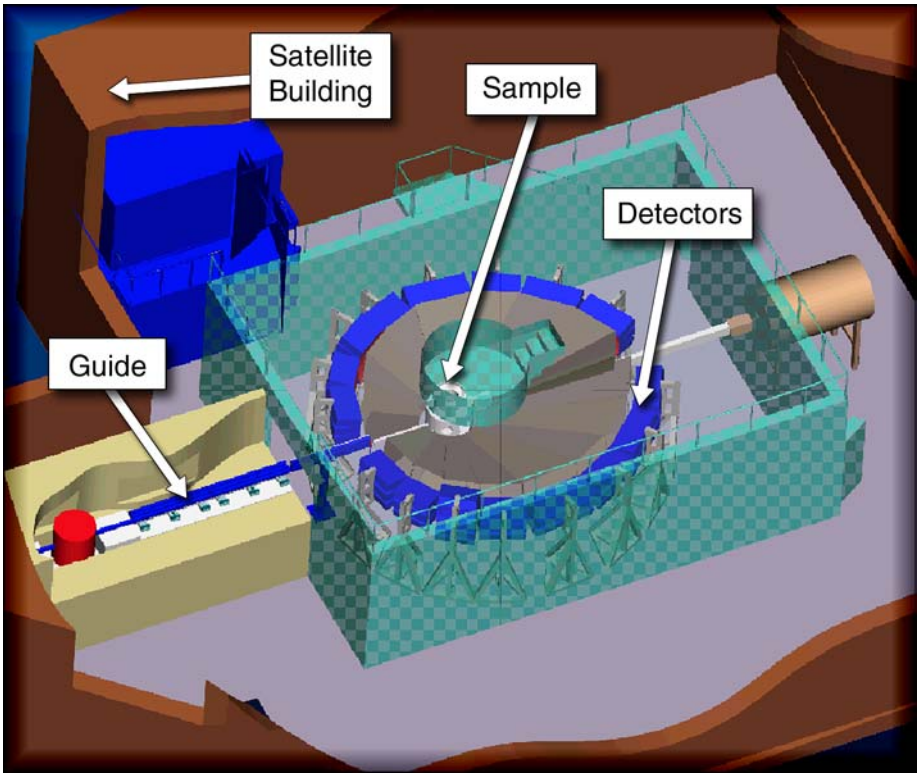
Aerial of the SNS site.

Artist's conception of the SNS overlaid on the actual construction site.

Clockwise from top, the SNS target building foundation, linac tunnel, linac tunnel interior, support building foundation, and ring tunnel foundation.

The initial concrete pour for a portion of the target building foundation was accomplished in one busy day. Concrete trucks, essentially all that were in the region, delivered 78 loads to the site at a rate of one truck every three minutes. Project structures call for ~80,000 cubic yards of concrete.



Secondary flight path for the powder diffractometer, one of the instruments recently selected for construction by the SNS. The sample is 60 m from the moderator, necessitating that the secondary flight path be in a satellite building outside the target building.